ANNOTATIONES ZOOLOGICAE JAPONENSES
Volume 48, No. 2—June 1975

Published by the Zoological Society of Japan

A New Species of Marine Interstitial Isopod of the Genus *Microcerberus* from the Bonin Islands

With 5 Text-figures

Tatsunori ITÔ

Zoological Institute, Hokkaido University, Sapporo, Hokkaido 060, Japan

ABSTRACT A new species of the genus *Microcerberus* is reported from sandy shores of the Bonin Islands. This is the first record of the interstitial fauna of the Bonin Islands. The new species is allied to *M. mexicanus* Pennak from a Mexican marine beach, but is clearly distinguishable from the latter in the structure of the second pleopod in male. Several important characteristics and problematic structures in some species within the genus are discussed from the taxonomic point of view.

A faunistic study in the marine interstitial habitat was attempted by me at the Bonin Islands in April 1973. During the two week visit to the islands, several different kinds of shores in five islands or islets, namely Chichijima, Hahajima, Mukôjima, Otôtojima and Minamishima, were surveyed, and particularly intensive samplings were carried out at the first mentioned two islands.

The Bonin Islands are located on the Western Pacific about 1,200 km south-southeast off Tokyo, and are characterized by the typical oceanic and subtropical climate. In these islands remote from the main islands of Japan, no study on the interstitial fauna has so far been carried out, while several important faunistic results for non-interstitital marine animals have already been published (see, Shigei, 1970; Ooishi, 1970). It was expected that the interstitial fauna of the islands would prove to be fairly distinct from those in the temperate region of the main islands of Japan. While the final evaluation for the result obtained might be postponed in future till the examination of all the samples would be finished, the fauna, as far as I glance, seems to be fairly noticeable as was expected.

The present paper treats a new species of the genus *Microcerberus* (Crustacea; Isopoda) as the first report of this study from the Bonin Islands. This new species is the third member of the genus from Japan (see, Nunomura, 1973; Itô, 1974). All the specimens were collected from Hahajima, Mukôjima and Otôtojima by means of so-called *decanting and sieving method.* The type-series is deposited in the Zoological Institute, Faculty of Science, Hokkaido University, Sapporo, Japan.

Suborder Microcerberidea Lang, 1961
Microcerberus Karaman, 1933

Microcerberus boninensis n. sp.
[Japanese name: Munin-Suna-nanafushi]

Male (Holotype). Body 0.75 mm in length, colorless and semitransparent. General appearance of whole body (Fig. 1–1) not differing from that of other species hitherto known of the genus. Cephalon about 1.3 times as long as greatest width, furnished with at least three pairs of hairs. First thoracic somite (abbr. peraeonite I) about as wide as cephalon but a little shorter; tergite apparently tapering behind, covering posterior part of cephalon. Tergites of peraeonites II (Fig. 1–2), III (Fig. 1–3, anterior part was broken during dissection) and IV distinctly narrower than that of preceding somite; each tergite separable into two parts by a shallow groove running on middle dorsal surface longitudinally, furnished with a triangular accessory plate on both outer anterior corners, each plate with a fine hair on about middle of free inner edge and a bare seta on outer edge near base; anterior edge bilobate, and with two setulae on both sides. Tergites of peraeonites V, VI and VII without accessory plate. This series of peraeonites II to VII gradually thickened posteriorly. Ventral surface near posterior end of peraeonite VII (Fig. 3–7) with a pair of slight protuberances. First abdominal somite (abbr. pleonite I) fairly shortened, less than half as long as peraeonite VII; one bare setula on both lateral sides. Pleonite II a little longer than previous somite. Pleotelson (Fig. 4–2) about as long as previous two somites combined, with one seta on each ventro-lateral side and a pair of setae on ventral surface near both posterior corners; several rows of very delicate spinules on ventral surface on and near both slight depressions lodging pleopods.

Antennule (Fig. 1–4) five-segmented; first segment with two bare setae on outer distal edge, one of which is spatulate and arises from a small cup-shaped protuberance; second one tapering apically, with three setae on outer side, of which the longest one is spatulate or rather lanceolate and strikingly plumose (Fig. 1–5), and two setae on inner distal edge; third and fourth segments small, with two slender setae and one spatulate seta, respectively; last one fairly longer than two preceding segments combined, with one seta on inner edge midst, three setulae, one much elongate seta and one thick aesthetasc terminally. *Antenna* (Fig. 1–6) 11-segmented, including each segment of flagellum. Second and third segments with a small protuberance on each inner edge. Sixth segment with a strong spatulate seta which arises from a cup-shaped protuberance and is somewhat hairy. Flagellum consisting of five more or less setigerous segments, tapering apically. *Mandible* (Fig. 2–1; cf. Figs. 2–2 and 3 for paratypes). Palpus arising from posterior side of a triangular protuberance of corpus, terminating in one bare seta. Pars incisiva four-dentate. Mandibulum dextrum with two spines and one apically serrate plate (lacinia mobilis) on cutting edge. Mandibulum sinistrum with three spines; lacinia mobilis well developed. *Maxillula* (Figs. 2–4, 5). Inner endite with three spinules

terminally. Outer endite furnished with seven claws and one spinulose spine along distal edge. *Maxilla* (Fig. 2–6). Protopodite two-segmented; proximal segment bare, distal one about twice as long as proximal, with lesser number of spinules on inner edge, and two strong, comb-like claws terminally. *Maxillipede* (Fig. 2–7)

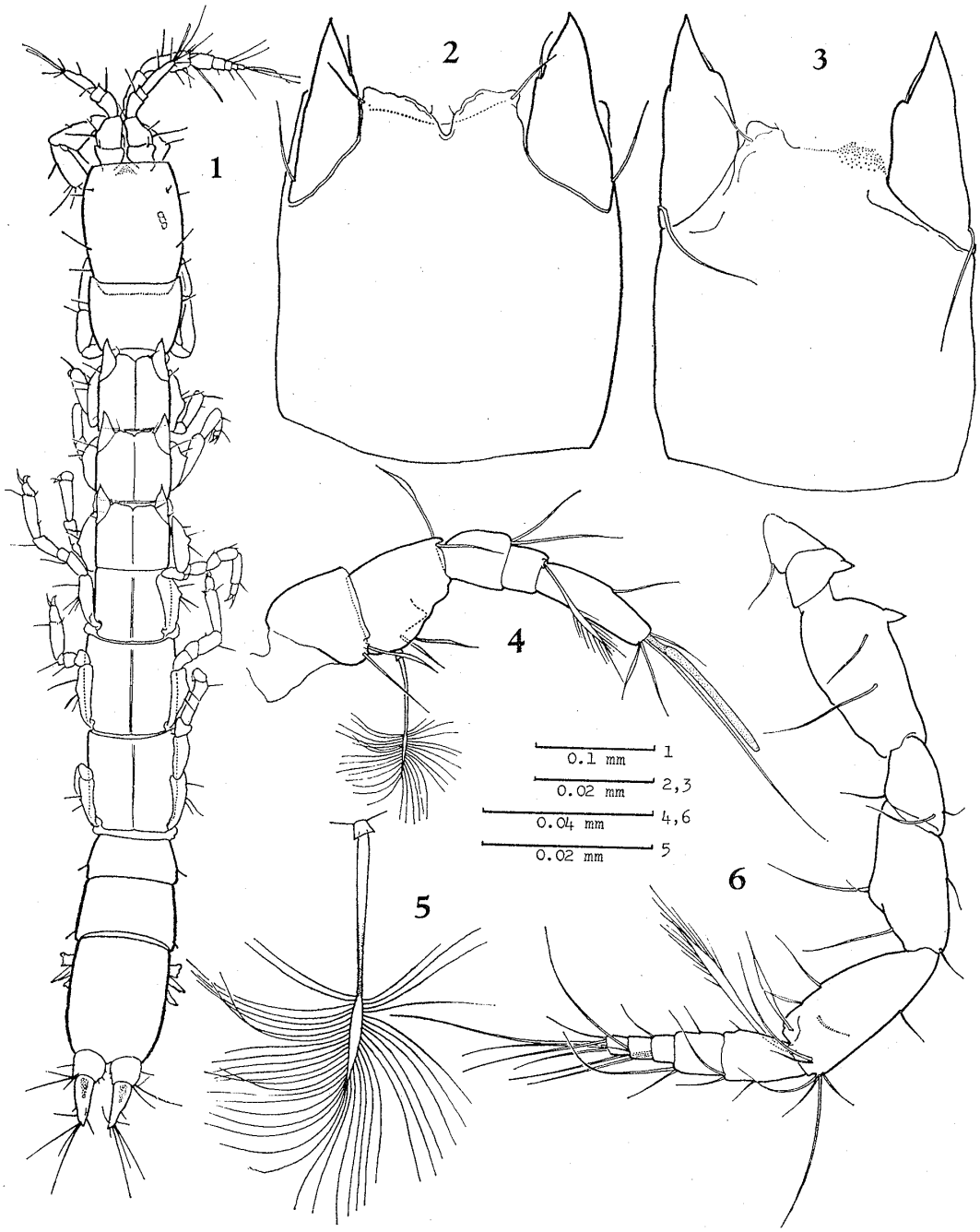

Fig. 1. *Microcerberus boninensis* n. sp. Male (Holotype).——1, Dorsum; 2, tergite of peraeonite II; 3, tergite of peraeonite III; 4, antennule; 5, plumose seta of second antennular segment; 6, antenna.

six-segmented; last segment furnished with two rows of several long spinules longitudinally. *Labium* (Fig. 2–8). Each lateral extremity ornamented with four spines and several delicate spinules.

Peraeopod I (Fig. 2–9) subchelate as usual. Carpus with several elongate fine spinules along posterior (ventral) edge. Proximalmost claw of propus bifurcate

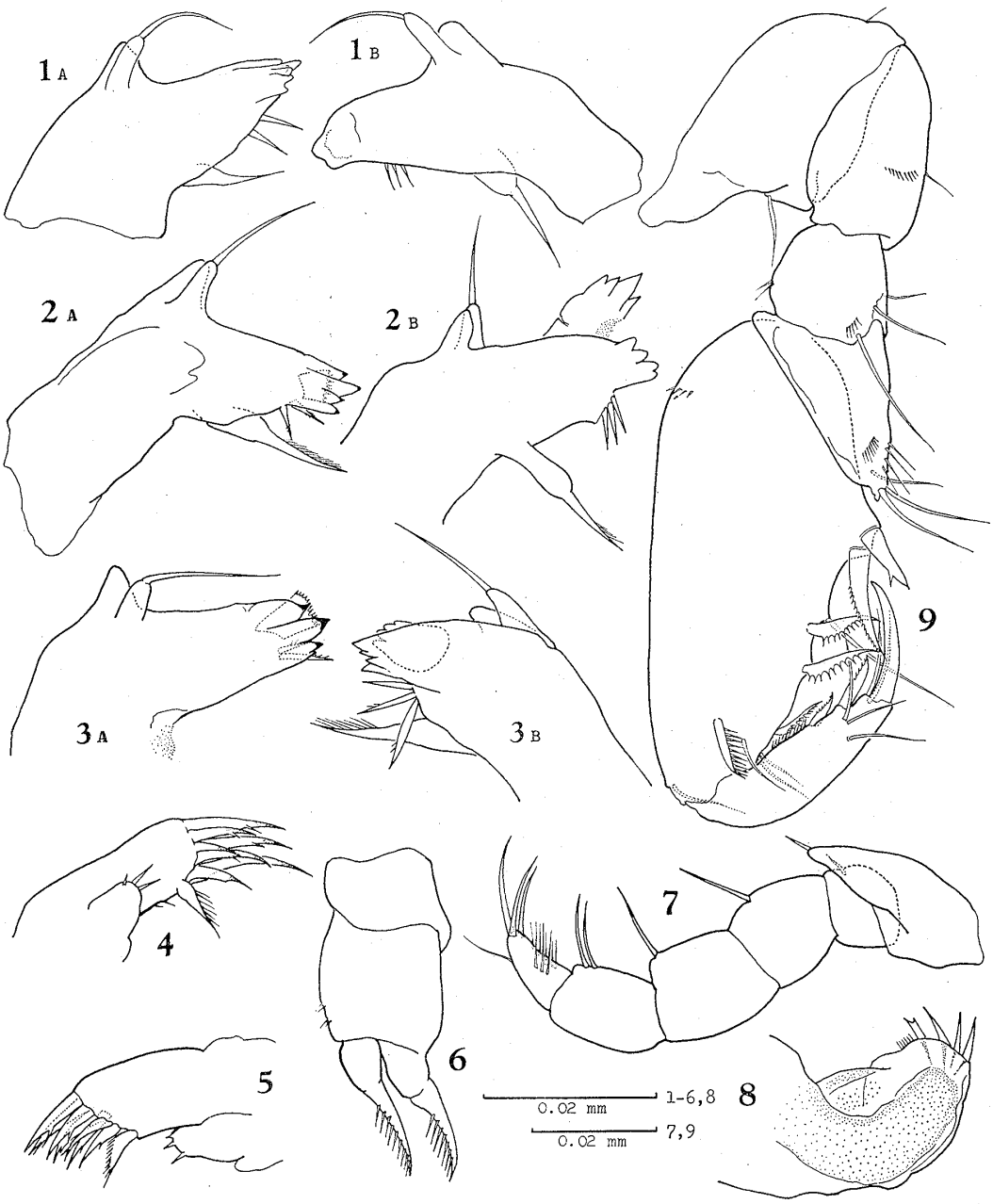

Fig. 2. *Microcerberus boninensis* n. sp. Male (Holotype; 2 and 3, paratypus).——1–3, A-mandibulum dextrum and B-mandibulum sinistrum; 4, maxillula; 5, ditto; 6, maxilla; 7, maxillipede; 8, labium; 9, peraeopod I.

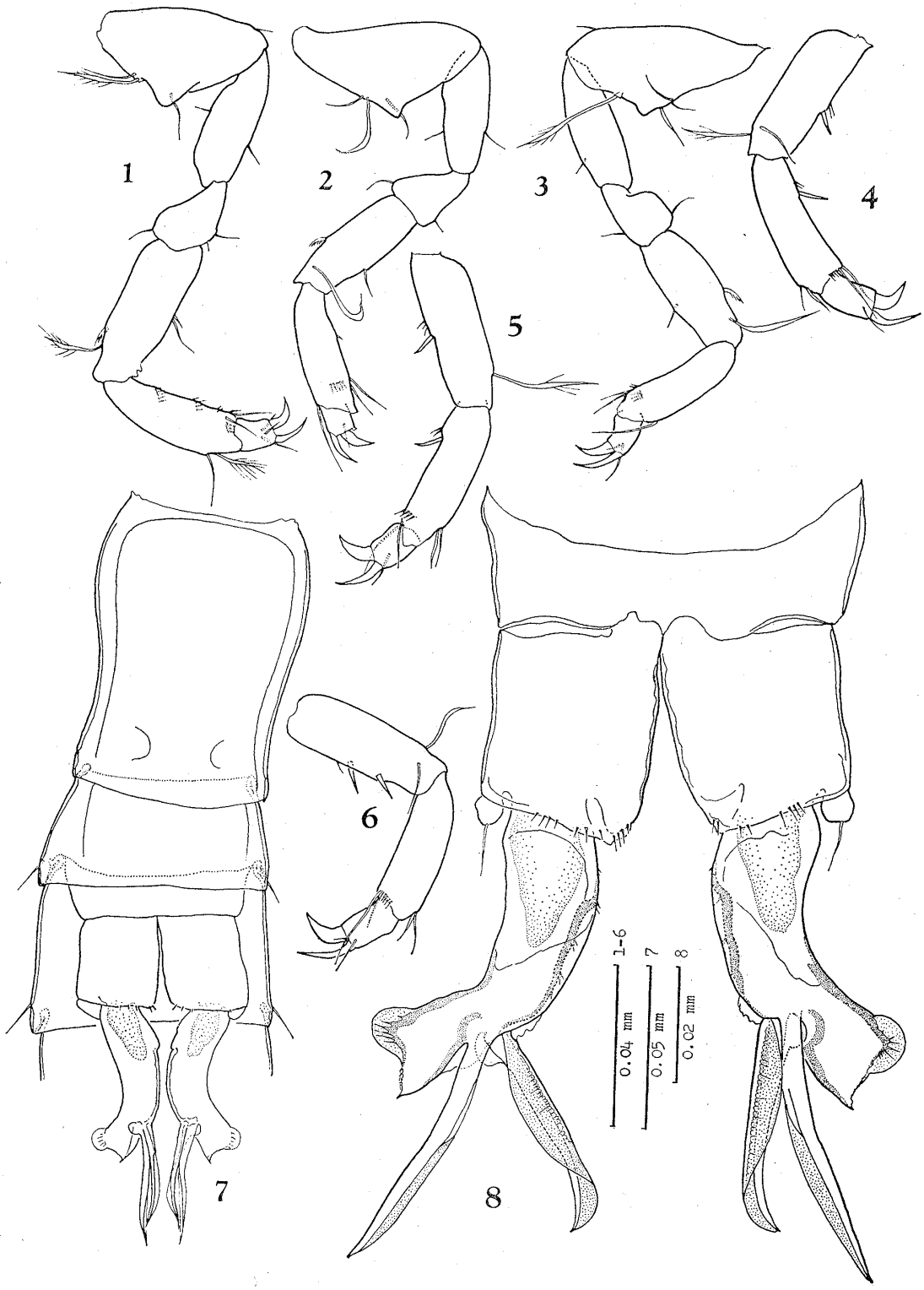

Fig. 3. *Microcerbrus boninensis* n. sp. Male (Holotype).——1–6, Peraeopods II–VII; 7, peraeonite VII and pleonites I and II, ventral view; 8, pleopod II, anterior (ventral) view.

apically, while all other claws more or less spinulose or serrate along each one side. *Peraeopods II–VII* (Figs. 3–1～7) normal walking leg. At least one seta of basis spatulate and more or less hairy. Propus of *peraeopods V* and *VI* ornamented with one stout spine marginally.

Pleopod I absent. *Pleopod II* (Figs. 3–7, 8). Both coxae represented by a broad plate, almost as wide as body width. Basis nearly rectangular in shape,

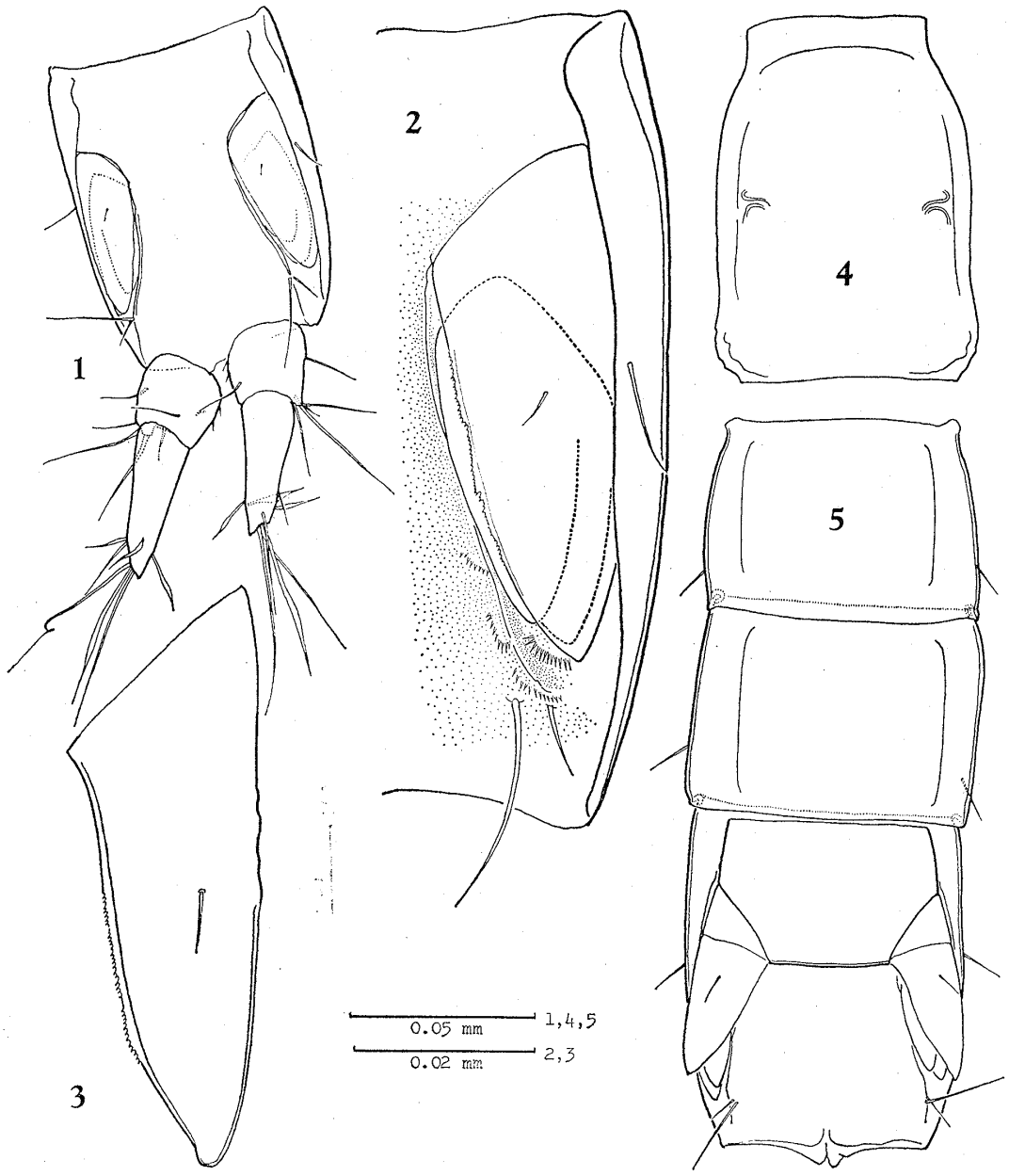

Fig. 4. *Microcerberus boninensis* n. sp. Male (Holotype; 3, paratype).——1, Pleotelson and uropods, ventral view; 2, left half of pleotelson; 3, pleopod III. Female (Allotype). ——4, Peraeonite V, ventral view; 5, pleonites I and II and pleotelson, ventral view.

slightly longer than wide, with some spinules along distal end of anterior (ventral) side. Exopodite small and bulbiform, with one bare setula. Endopodite fairly outcurved, forming a strong process which arises from about two-thirds the length of inner edge and is accompanied with one movable spine at base. Endopodite segment, inner process excluded, about as long as two basal segments combined, with several spinules on and near inner edge; outer distal corner fringed with a hyaline membrane; inner distal corner slightly sharpened. Inner process almost as long as endopodite segment, of rather spiniform appearance, but never articulate at base, fringed with a narrow hyaline membrane along inner margin of distal half. Movable spine a little shorter than inner process described, with a half-round hyaline membrane at outer base, and with a well developed membrane along full length of inner margin; above mentioned membrane turning out anteriorly (ventrally), and consisting of two morphologically discernible parts, i.e., the basal part contiguous to the inner margin of the spine and the distal part constituting the free margin of this membrane; the former is rather thick and opaque, and of particular appearance just like serration along the extremity remote from the spine, while the latter is very thin and entirely transparent. *Pleopod III* (Figs. 4–2, and 4–3 for paratype) represented by a very thin plate tapering distally, with one setula nearly on center; inner margin very finely serrate. *Pleopod IV* (Fig. 4–2) almost covered with pleopod III, bilobate and rather fleshy in appearance. Protopodite obscure. *Uropod* (Fig. 4–1). Basis about as long as wide, spinulose at inner edge. Exopodite represented by a small protuberance of basis. Endopodite almost twice as long as basis, gradually tapering, with several spatulate or normal setae on and near distal end.

Female (Allotype). Body 0.90 mm in length. Peraeonite V with a pair of short grooves on ventral side (Fig. 4–4). Peraeonite VII without particular ornamentation on ventral surface. *Pleopod II* absent. A distinct anterior sternite differentiated between both pleopods III (Fig. 4–5). *Pleopod III* apparently partitioned into two parts by a shallow transverse groove. Other structures same as in male.

Variability. Seven males and two females were dissected. No particular difference was recognized among them except for size. The body length of males ranges from 0.75 mm to 0.81 mm.

Discussion

The present new species is closely related to *Microcerberus mexicanus* Pennak, 1958, from Mexico in the five-segmented antennule, the five-segmented flagellum of the antenna, and general appearance of the second pleopod of male. As far as it is judged from the description and figure of the pleopod by Pennak (1958), both the inner process and the movable spine (=the lateral division and the median division by Pennak) seem to arise from the inner distal corner of the endopodite segment, while they arise from the inner edge at two-thirds the length in the present new

species. In this respect these two species are clearly discernible from each other.

On the other hand, an important morphological problem for the peculiar structure in the second pleopod is revealed among the present species and several other species so far known. The movable spine has a well developed hyaline membrane which partially forms peculiar thickening like serration in appearance as already mentioned. This hyaline membrane seems to be homologous to the membrane fringing the appendix masculina in *M. fukudai* Itô, 1974, from Hokkaido. Further, the latter species is apparently related to *M. abbotti* Lang, 1961, from California (see Itô, 1974) in the principal structure of the second pleopod. In this connection, Lang (1961) did not describe the presence of such membrane in his species. Nevertheless his figure seems to show the presence of a very narrow membrane along nearly full length of the appendix masculina.

The serration-like thickening of the hyaline membrane occasionally misleads one as if it were a spinular row on inner margin or outer margin of the spine, and in a further extreme case even on the inner process when the movable spine is contiguous to the inner process. Sometimes, adding to this misinterpretation, the turning ridge of the membrane misleads one as though it were a distinct slender spine parallel with the movable spine (Fig. 5 is an attempt to show this condition).

Considering such ambiguity and difficulty for recognizing the real shape, the structure of the second pleopod in some species previously reported seems to be rather dubious. For example, it is not probable that the presence of three

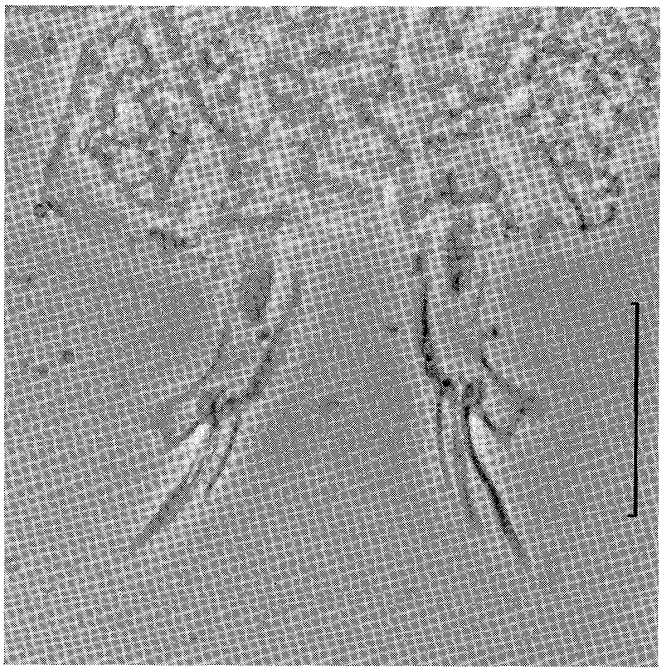

Fig. 5. *Microcerberus boninensis* n. sp. Male (Paratype). Pleopod II, explanation in text. Bar represents 0.05 mm.

appendages on the apex of the second pleopodal endopodite in *M. phreaticus* Cvetkov, 1963, from Bulgaria is realistic, but it may have two. While I have not yet examined any specimens of *M. phreaticus*, the presence of 'spinular row' as well as articulation-like appearance on the appendices in that species gives a strong guarantee for my supposition.

The third pleopod of both sexes has not always been regarded as taxonomically important, except for quite rare cases (see Coineau and Delamare Deboutteville, 1968). But the shape of this pair of pleopods in the present new species apparently differs from that of *M. abbotti abbotti* Lang, *M. abbotti juani* Coineau et Delamare Deboutteville, 1968, *M. kiiensis* Nunomura, 1973, and *M. fukudai* Itô. Most other species have not been described in this respect, or if described, only very poor information has been given.

The sexual dimorphism in the third pleopod and the differentiation of anterior sternite of pleotelson in the present new species completely accords with those in *M. fukudai*. Such dimorphism might also be found in other species so far known by further studies. Critical re-examination of other species on this respect as well as some other important characteristics is much needed to clarify some problems not only taxonomic but also phylogenetic.

This genus seems to be constituted by some species-groups on several distinct evolutional lines. In near future, despite of the presence of several dubious species (see Lang, 1961), the genus *Microcerberus* will be separated into some distinct genera after careful re-examination for several important characters. In this case, *M. boninensis* and *M. mexicanus* apparently constitute a genus, and *M. pauliani* Chappuis et Delamare Deboutteville, 1956, *M. abbotti, M. kiiensis* and *M. fukudai* form another one.

Material. Holotype ♂, allotype ♀, paratypes 6♂♂ and 1♀ (11–IV–1973, Mukôjima; sand and pebbles; Itô leg.). 1♂, 1♀ and 1 manca stage (18–IV–1973, Otôtojima; sand; Itô leg.). 2♀♀ and 1 manca stage (14–IV–1973, Kita harbor, Hahajima; sand and pebbles; Itô leg.).

Acknowledgments

I express my cordial thanks to Messrs. Kaoru Hasegawa and Masao Shimizu, Ogasawara Branch, Tokyo Metrop. Government and Mikio Iga, Ogasawara Fruit Fly Laboratory, Ogasawara–Tokyo, who gave me much facilities during the course of this survey in the islands. Sincere thanks are also due to Messrs. Michihiro Mihara and Tetsuo Aoyagi, Tokyo, and Dr. Shôichi F. Sakagami and Mr. Masanori J. Toda, Hokkaido University, without whose generous help the work of collecting many samples from various localities would have been impossible in the limited time. Further I would like to express my gratitudes to Professor Dr. Mayumi Yamada, Hokkaido University, for reading the manuscript.

REFERENCES

Chappuis, P. A., and Cl. Delamare Deboutteville, 1956. Recherches sur la faune interstitielle des sédiments marine et d'eau douce à Madagascar; *Microcerberus pauliani* n. sp. (Crustacés Isopodes). *Mém. Inst. Sci. Madagascar*, (A), **10**: 81–88.

Coineau, N., and Cl. Delamare Deboutteville, 1968. Étude des microcerbérides (Crustacés, Isopoda) de la côte Pacifique des États-Unis, 1re partie: Systématique. *Bull. Mus. Hist. nat.*, Paris, (2), **39**: 955–964.

Cvetkov, L., 1963. Nouveaux représentants du genre *Microcerberus* trouvés en Bulgarie. *Bull. Inst. Zool. Mus., Acad. Sci. Bulgarie*, **14**: 153–163. (In Bulgarian, with Russian and French summaries.)

Itô, T., 1974. A new species of marine interstitial isopod of the genus *Microcerberus* from Hokkaido. *J. Fac. Sci. Hokkaido Univ.*, (VI–Zool.), **19**: 338–348, pl. XXVII.

Lang, K., 1961. Contributions to the knowledge of the genus *Microcerberus* Karaman (Crustacea, Isopoda) with a description of a new species from the central Californian coast. *Arch. Zool.*, **13**: 473–510, pls. 1–3.

Nunomura, N., 1973. Description of *Microcerberus kiiensis*, n. sp.: Primary record of the suborder Microcerberidea (Crustacea, Isopoda) in Japan. *Publ. Seto Mar. Biol. Lab.*, **21**: 89–93.

Ooishi, Sh., 1970. Marine invertebrate fauna of the Ogasawara and Volcano Islands collected by S. Ooishi, Y. Tomida, K. Izawa and S. Manabe. *In* Report on the Marine Biological Expedition to the Ogasawara (Bonin) Islands, 1968, pp. 75–104, 25 pls. Toba Aquarium and Asahi Simbun Publishing Company, Tokyo.

Pennak, R. W., 1958. A new micro-isopod from a Mexican marine beach. *Trans. Amer. micros. Soc.*, **77**: 298–303.

Shigei, M., 1970. Marine invertebrate fauna of the Bonin Islands. *In* The Nature of the Bonin and the Volcano Islands, pp. 45–60. Higher Education and Science Bureau, Ministry of Education and Cultural Properties Protection Division, Agency for Cultural Affairs, Tokyo. (In Japanese, with English summary.)